

REMARKSINTRODUCTION:

In accordance with the foregoing, claims 37, 39, 41, 43, and 46 have been canceled without prejudice or disclaimer in response to the Examiner Restriction Requirement, and claim 30 has been amended to correct a typographical error and not to narrow the scope of the claim. No new matter is being presented, and approval and entry are respectfully requested.

Claims 1, 2, 13-17, 19, 21, 23, 24, 27, 30, 31, and 38, 40, 42, 44, 45, and 47 are pending and under consideration. Reconsideration is requested.

ENTRY OF AMENDMENT UNDER 37 C.F.R. §1.116:

Applicants request entry of this Rule 116 Response because:

(1) the amendment of claim 30 should not entail any further search by the Examiner since no new features are being added or no new issues are being raised; and

(2) the amendment does not significantly alter the scope of the claim and places the application at least into a better form for purposes of appeal. No new features or new issues are being raised.

The Manual of Patent Examining Procedures sets forth in Section 714.12 that "any amendment that would place the case either in condition for allowance or in better form for appeal may be entered." Moreover, Section 714.13 sets forth that "the Proposed Amendment should be given sufficient consideration to determine whether the claims are in condition for allowance and/or whether the issues on appeal are simplified." The Manual of Patent Examining Procedures further articulates that the reason for any non-entry should be explained expressly in the Advisory Action.

REJECTION UNDER 35 U.S.C. §102:Rejection of claims 1, 2, 31, 44, 45, and 47

In the Office Action at page 2, the Examiner rejects claims 1, 2, 31, 44, 45, and 47 under 35 U.S.C. §102(a) in view of the Admitted Prior Art on pages 1-3 and FIGs. 1 and 2 of the instant application. This rejection is respectfully traversed and reconsideration is requested.

On page 5 of the Office Action, the Examiner clarifies that the Admitted Prior Art does disclose forming a plurality of fluid jetting apparatuses since it is inherent in the electrical manufacturing arts to manufacture more than one fluid jetting apparatus. However, it is respectfully noted that, while the Admitted Prior Art discloses forming multiple fluid jetting

apparatuses, the Admitted Prior Art discloses forming multiple fluid jetting apparatuses individually from corresponding multiple nozzle parts 30, membranes 20, and heat driving parts 10. (Page 1, lines 20-23 and FIG. 1 of the Admitted Prior Art) In order to form the nozzle parts 30, the nozzle plates 32 need to be manufactured. To manufacture the nozzle plates 32, a roll of material for the nozzle plates 32 moves past the treating apparatus 53, where the nozzles 34 are formed on areas which become the nozzle plates 32. After the nozzles 34 are formed, the individual nozzle plates 32 are sectioned and mated with corresponding remaining elements. As such, with the exception of the nozzle plates 32, the remaining components of both the nozzle part 30 and the fluid jetting apparatus are manufactured piece-by-piece. (Page 3, lines 5-11; FIGs. 1 and 2 of the Admitted Prior Art)

In contrast, claim 1 recites that multiple fluid jetting apparatuses are formed from a common wafer. Specifically, a single nozzle part, a membrane, and a single heat driving part are combined to form a wafer that includes multiple fluid jetting apparatuses. Thus, claim 1 recites a method of forming multiple fluid jetting apparatuses at once using a single wafer, whereas the Admitted Prior Art discloses forming individual fluid jetting apparatuses piece-by-piece. As such, it is respectfully submitted that the Admitted Prior Art does not disclose a method of "adhering a membrane to the nozzle part and a heat driving part to position the heat driving part, the membrane and the nozzle part *in order to form the fluid jetting apparatuses in the shape of a wafer*" as recited in claim 1.

Similarly, it is respectfully submitted that the Admitted Prior Art does not disclose "adhering a nozzle part to a membrane as a wafer type" and "adhering the membrane to a heat driving part, *to form the fluid jetting apparatuses as a wafer type*" as recited in claim 31.

Further, claim 45 recites that a nozzle part is adhered to the membrane, where the nozzle part has multiple nozzles. The membrane is adhered to the heat driving part, where the combination results in multiple fluid jetting apparatuses having corresponding nozzles. In contrast, in the Admitted Prior Art, prior to being separated, only the nozzle plate 32 has multiple nozzles 34. However, prior to being combined to form the multiple fluid jetting apparatuses, the nozzle plates 34 are separated into individual nozzle plates 34, and the fluid jetting apparatuses are individually assembled using the individual nozzle plates 34. As such, it is respectfully submitted that the Admitted Prior Art does not disclose "adhering a *nozzle part having nozzles* to a membrane" and "adhering the membrane to a heat driving part *to form fluid jetting apparatuses, each fluid jetting apparatus having one of the nozzles*" as recited in claim 45.

In addition, claim 44 recites that the wafer is split to separate the fluid jetting

apparatuses. In contrast, the Admitted Prior Art discloses splitting the nozzle plates 32 after the nozzles 34 are formed, and then completing the fluid jetting apparatus piece-by-piece. As such, it is respectfully submitted that the Admitted Prior Art does not disclose "splitting the wafer type fluid jetting apparatus into separate fluid jetting apparatuses" as recited in claim 44, and similarly recited in claim 47.

Claim 2 is deemed patentable due at least to its depending from claim 1.

Rejection of claims 17, 19, and 40

In the Office Action at page 3, the Examiner rejects claims 17, 19, and 40 under 35 U.S.C. §102(b) in view of Leban (U.S. Patent No. 5,229,785). The rejection is respectfully traversed and reconsideration is requested.

On page 5 of the Office Action, the Examiner clarifies that Leban does disclose forming a plurality of fluid jetting apparatuses since it is inherent in the electrical manufacturing arts to manufacture more than one fluid jetting apparatus. By way of review, Leban discloses using a conventional thin film printhead construction process that uses a plastic orifice plate instead of a metal orifice plate. (Col. 2, lines 40-46 of Leban) FIGs. 1A through 1H disclose the process of making the inkjet printhead, where the printhead includes an orifice opening 20 and a firing chamber 32. (Col. 4, lines 5-9 of Leban) The process used is a photolithography process, whereby various layers such as a photoresist layer 12, a plastic material 14, and an insulating barrier 22 are coated and etched to form the orifice opening 20 and the firing chamber 32. Previously formed heater resistors 36 are disposed on a resistor substrate 34, and the resistor substrate 34 is then attached to the insulating barrier 22 to complete the printhead. The heater resistor 36, the firing chamber 32, and the orifice opening 20 are disclosed as being one of a plurality created using the process for "a thermal ink jet printhead." (Col. 6, lines 4-9 of Leban) As such, Leban discloses forming a single printhead having one or more orifice openings 20, heater resistors 36, and firing chambers 32. There is no disclosure that multiple printheads are formed from a single plastic material layer 14 and insulating barrier 22 formed using the process of Leban.

In contrast, claim 17 recites that the formed and adhered nozzle part, membrane, and heat driving part form multiple fluid jetting apparatuses. Specifically, claim 17 recites a process of forming a single nozzle part, adhering the nozzle part to a single membrane, and adhering the membrane to a single heat driving element to form the multiple fluid jetting apparatuses. As such, it is respectfully submitted that Leban does not disclose or suggest "forming a nozzle part on a silicon wafer by a spinning process," "adhering the nozzle part with the silicon wafer to a

membrane," "removing the silicon wafer from the nozzle part," and "adhering the membrane to a heat driving part to form the fluid jetting apparatuses" as recited in claim 17.

Further, the Examiner asserts that the photoresist 12 corresponds to the membrane recited in claim 17. However, it is noted that, while the photoresist 12 is disclosed as being attached to the substrate 10 and the plastic material 14 as shown in FIG. 1C, the photoresist 12 is not disclosed as being attached to the heater resistors 36 and/or the resistor substrate 34. As such, it is respectfully submitted that Leban further does not disclose "adhering the membrane to a heat driving part to form the fluid jetting apparatuses" as recited in claim 17.

In addition, on page 4 of the Office Action, the Examiner asserts that the act of removing the nozzle plate from the wafer acts to split the fluid jetting apparatus into multiple fluid jetting apparatuses. However, it is noted that FIG. 1H, in which the substrate 10 is removed, does not show that the printhead has been split. Further, Leban discloses that the substrate 10 is removed "leaving intact the print engine shown in FIG. 1H." (Col. 6, lines 10-20 of Leban) There is no disclosure that the printhead is split to form multiple printheads since the printhead shown in FIG. 1H is shown as being ready for mounting, and not requiring any additional processing, such as splitting, to form the printheads. (Col. 6, lines 18-20 of Leban)

In contrast, claim 40 recites that the adhered nozzle part, membrane, and heat driving part are split to form separate fluid jetting apparatuses. Therefore, it is respectfully submitted that Leban does not disclose "splitting the adhered nozzle part, membrane, and heat driving part into separate fluid jetting apparatuses" as recited in claim 40.

Claim 19 is deemed patentable due at least to its depending from claim 17.

REJECTION UNDER 35 U.S.C. §103:

Rejection of claims 17, 19, and 40

In the Office Action at page 3, the Examiner rejects claims 17, 19, and 40 under 35 U.S.C. §103 in view of Leban and the Examiner's taking Official Notice that the use of silicon wafers is well known in the electrical manufacturing arts. The rejection is respectfully traversed and reconsideration is requested.

Even assuming arguendo that the Examiner's taking Official Notice is correct, since the Examiner's taking Official Notice does not cure the above noted defect of Leban as applied to claims 17, 19, and 40 as discussed above, it is respectfully submitted that the combination of Leban and the Official Notice does not disclose or suggest the invention recited in claims 17, 19, and 40.

Rejection of claims 17, 23, 27, 30, 40, and 42

In the Office Action at page 4, the Examiner rejects claims 17, 23, 27, 30, 40, and 42 under 35 U.S.C. §103 in view of Leban and Pan (U.S. Patent No. 4,894,664). The rejection is respectfully traversed and reconsideration is requested.

On page 5 of the Office Action, the Examiner clarifies that Pan and Leban disclose forming a plurality of fluid jetting apparatuses since it is inherent in the electrical manufacturing arts to manufacture more than one fluid jetting apparatus. By way of review, Pan discloses forming a monolithic ink jet printhead 20 having a cantilever beam 12, a nozzle area 17, a heating element in the form of a resistor layer 15, a well 11, and a nozzle 19. The beams 12 are formed by electroplating a nickel layer 40 onto a substrate 10. (Col. 3, lines 17-19 of Pan) The well 11 is etched from the substrate 10, and an insulating layer 21 is deposited on the nickel layer 40, the well 11, and the beams 12 to encourage the efficient operation of the resistor layer 15. Portions of the resistor layer 15 are shorted out except for the resistor layer 15 on the beams 12. (Col. 3, lines 25-27, 32-38, 44-48; FIG. 6C of Pan) The nozzle 19 is formed using an electroplating process onto a conducting layer 27, where the conducting layer 27 provides a surface on which the nozzle 19 can be constructed. A slab 56 acts as a mold for the nozzle 19. (Col. 2, lines 45-68, col. 3, lines 62-66, col. 4, lines 2-7; FIG. 3 of Pan) These layers are disclosed as forming the single printhead 20 shown in FIG. 3. (Col. 3, lines 17-19, and 64-68 through col. 4, lines 1-9; FIGs. 8A-8C of Pan) However, there is no disclosure that the process is used to form multiple printheads 20 since the process in Pan discloses forming the printheads 20 individually.

In contrast, claim 17 recites that the formed and adhered nozzle part, membrane, and heat driving part form multiple fluid jetting apparatuses. Specifically, claim 17 recites a process of forming a single nozzle part, adhering the nozzle part to a single membrane, and adhering the membrane to a single heat driving element to form the multiple fluid jetting apparatuses. Since Leban does not disclose forming multiple fluid jetting apparatuses using the single nozzle part, membrane, and heat driving element as discussed above, it is respectfully submitted that the combination of Leban and Pan does not disclose or suggest "forming a nozzle part on a silicon wafer by a spinning process," "adhering the nozzle part with the silicon wafer to a membrane," "removing the silicon wafer from the nozzle part," and "adhering the membrane to a heat driving part to form the fluid jetting apparatuses" as recited in claim 17.

Similarly, it is respectfully submitted that the combination of Leban and Pan does not disclose or suggest "adhering the nozzle part to the membrane, and the membrane to the heat driving part to form the fluid jetting apparatuses" as recited in claim 27.

In addition, on page 4 of the Office Action, the Examiner asserts that the act of removing the first dielectric wafer acts to split the fluid jetting apparatus into multiple fluid jetting apparatuses. However, it is noted that Pan does not disclose such a process, and instead discloses that the process results in the formation of individual monolithic printheads 20, such as that shown in FIG. 3. Further, Leban similarly does not disclose that the printhead is split to form multiple printheads since the printhead shown in FIG. 1H is shown as being ready for mounting, and not requiring any additional processing, such as splitting, to form the printheads. (Col. 6, lines 18-20 of Leban)

In contrast, claim 40 recites that the adhered nozzle part, membrane, and heat driving part are split to form separate fluid jetting apparatuses. Therefore, it is respectfully submitted that the combination of Pan and Leban does not disclose "splitting the adhered nozzle part, membrane, and heat driving part into separate fluid jetting apparatuses" as recited in claim 40, and similarly recited in claim 42.

Claims 23, 30 are deemed patentable due at least to their depending from corresponding claims 17 and 27.

STATUS OF CLAIMS NOT REJECTED IN OFFICE ACTION:

On page 6 of the Office Action, the Examiner states that claims 13-16, 21, and 24 are allowed, and that claims 14-16 have been rejoined with allowed generic claim 13.

ATTACHMENT:

Attached hereto is a "Version With Markings to Show Changes Made," comprising a marked-up version of changes made to the Claims by the current amendment.

CONCLUSION:

In accordance with the foregoing, it is respectfully submitted that all outstanding objections and rejections have been overcome and/or rendered moot. And further, that all pending claims patentably distinguish over the prior art. Thus, there being no further outstanding objections or rejections, the application is submitted as being in condition for allowance which action is earnestly solicited. At a minimum, this Amendment should be entered at least for purposes of Appeal as it either clarifies and/or narrows the issues for consideration by the Board.

If the Examiner has any remaining issues to be addressed, it is believed that prosecution can be expedited and possibly concluded by the Examiner contacting the

undersigned attorney for a telephone interview to discuss any such remaining issues.

If there are any additional fees associated with the filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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VERSION WITH MARKING TO SHOW CHANGES MADE

IN THE CLAIMS

Please **AMEND** claim 30, as follows. The remaining claims are reprinted, as a convenience to the Examiner, as they presently stand before the U.S. Patent and Trademark Office.

1. (NOT AMENDED) A process of manufacturing a plurality of fluid jetting apparatuses at once, comprising:

forming a nozzle part by a spinning process; and

then adhering a membrane to the nozzle part and a heat driving part to position the heat driving part, the membrane and the nozzle part in order to form the fluid jetting apparatuses in the shape of a wafer.

2. (NOT AMENDED) The process of manufacturing a plurality of fluid jetting apparatuses as claimed in claim 1, further comprising:

forming electrodes and heating elements on a first substrate of wafer;

forming driving fluid barriers on the electrodes and the heating elements; and

forming driving fluid chambers in the driving fluid barriers, to form the heat driving part.

3-12 (PREVIOUSLY CANCELED)

13. (NOT AMENDED) A process of manufacturing a plurality of fluid jetting apparatuses, comprising:

forming electrodes and heat elements on a first substrate of silicon wafer, forming driving fluid barriers on the electrodes and heat elements, and driving fluid chambers in the driving fluid barriers, to form a heat driving part;

forming a polyimide coating layer on a second substrate of silicon wafer, forming an adhesive polyimide coating layer on the polyimide coating layer, attaching a first reinforcing ring to the adhesive polyimide coating layer, and separating the polyimide coating layer from the second substrate after attaching the first reinforcing ring on the adhesive polyimide coating layer, to form a membrane;

attaching a second reinforcing ring beneath a third substrate of silicon wafer by the spinning process, forming a nozzle plate on an opposite side of the third substrate from that of

the second reinforcing ring, forming jetting fluid barriers on the nozzle plate, forming jetting fluid chambers in the jetting fluid barriers, and forming nozzles in the nozzle part;

adhering the polyimide coating layer of the membrane to the jetting fluid barriers, and separating the second reinforcing ring and the third substrate of silicon wafer, from the nozzle plate; and

adhering the adhesive polyimide coating layer of the membrane to the driving fluid barriers of the heat driving part.

14. (NOT AMENDED) The process of manufacturing a plurality of fluid jetting apparatuses as claimed in claim 13, wherein the forming of the polyimide coating layer on the second substrate and the forming of the adhesive polyimide coating layer on the polyimide coating layer are accomplished by the spinning process.

15. (NOT AMENDED) The process of manufacturing a plurality of fluid jetting apparatuses as claimed in claim 13, wherein the forming of the nozzles in the nozzle plate is accomplished by using a laser beam from a treating apparatus.

16. (NOT AMENDED) The process of manufacturing a plurality of fluid jetting apparatuses as claimed in claim 13, wherein the forming of the nozzles in the nozzle plate is accomplished by a process of reactive ion etching.

17. (AS ONCE AMENDED) A process of manufacturing a plurality of fluid jetting apparatuses at once, comprising:

forming a nozzle part on a silicon wafer by a spinning process;
adhering the nozzle part with the silicon wafer to a membrane;
removing the silicon wafer from the nozzle part; and
adhering the membrane to a heat driving part to form the fluid jetting apparatuses.

18. (CANCELED)

19. (NOT AMENDED) The process of manufacturing a plurality of fluid jetting apparatuses as claimed in claim 17, wherein the forming of the nozzle part comprises:

forming a nozzle plate on a first substrate by the spinning process;
forming jetting fluid barriers on the nozzle plate by the spinning process;

forming a first reinforcing element on the first substrate;
forming jetting fluid chambers in the jetting fluid barriers; and
forming nozzles in the nozzle plate.

20. (PREVIOUSLY CANCELED)

21. (AS ONCE AMENDED) A process of manufacturing a plurality of fluid jetting apparatuses at once, comprising:

forming a nozzle part on silicon wafer by a spinning process, the forming the nozzle part comprising:

forming jetting fluid barriers on the nozzle plate by the spinning process;
forming a first reinforcing element on the first substrate;
forming jetting fluid chambers in the jetting fluid barriers; and
forming nozzles in the nozzle plate;

forming a membrane, the forming the membrane comprising

forming a polyimide coating layer on a second substrate of silicon wafer;
forming an adhesive polyimide coating layer on the polyimide coating layer;
forming a second reinforcing element on the adhesive polyimide coating layer;

and

separating the polyimide coating layer from the second substrate after forming the second reinforcing element on the adhesive polyimide coating layer;

adhering the nozzle part with the silicon wafer to the membrane;
removing the silicon wafer from the nozzle part; and
adhering the membrane to a heat driving part.

22. (PREVIOUSLY CANCELED)

23. (NOT AMENDED) The process of manufacturing a plurality of fluid jetting apparatuses as claimed in claim 17,

forming the heat driving part, comprising

forming electrodes and heat elements on a substrate of silicon wafer;
forming driving fluid barriers on the electrodes and the heat driving elements;

and

forming driving fluid chambers in the driving fluid barriers.

24. (NOT AMENDED) The process of manufacturing a plurality of fluid jetting apparatuses as claimed in claim 21,

forming the heat driving part, comprising

forming electrodes and heat elements on a third substrate of silicon wafer;

forming driving fluid barriers on the electrodes and the heat driving elements;

and

forming driving fluid chambers in the driving fluid barriers.

25-26. (PREVIOUSLY CANCELED)

27. (AS ONCE AMENDED) A process of manufacturing a plurality of fluid jetting apparatuses, comprising:

forming a nozzle part on a first substrate of silicon wafer by a spinning process;

forming a membrane on a second substrate of silicon wafer by the spinning process;

forming a heat driving part by forming electrodes and heat elements on a third substrate of silicon wafer; and

adhering the nozzle part to the membrane, and the membrane to the heat driving part to form the fluid jetting apparatuses.

28-29. (PREVIOUSLY CANCELED)

30. (ONCE AMENDED) The process of manufacturing a plurality of fluid jetting apparatuses as claimed in claim 27, wherein:

the forming of the electrodes on the third substrate is performed by [an] a lithography process or a wet etching process; and

the forming of the heat elements on the third substrate is performed by the lithography process, the spinning process or a lift-off process.

31. (NOT AMENDED) A process of manufacturing a plurality of fluid jetting apparatuses, comprising:

adhering a nozzle part to a membrane as a wafer type; and

adhering the membrane to a heat driving part, to form the fluid jetting apparatuses as a wafer type.

32-36 (PREVIOUSLY CANCELED).

37. (CANCELED)

38. (NOT AMENDED) The process of claim 1, further comprising splitting the fluid jetting apparatus in the form of the wafer into separate fluid jetting apparatuses.

39. (CANCELED)

40. (NOT AMENDED) The process of claim 17, further comprising splitting the adhered nozzle part, membrane, and heat driving part into separate fluid jetting apparatuses.

41 (CANCELED)

42. (NOT AMENDED) The process of claim 27, further comprising splitting the adhered nozzle part, membrane, and heat driving part into separate fluid jetting apparatuses.

43. (CANCELED)

44. (NOT AMENDED) The process of claim 31, further comprising splitting the wafer type fluid jetting apparatus into separate fluid jetting apparatuses.

45. (NOT AMENDED) A process of forming fluid jetting apparatuses, comprising:
adhering a nozzle part having nozzles to a membrane; and
adhering the membrane to a heat driving part to form fluid jetting apparatuses, each fluid jetting apparatus having one of the nozzles.

46. (CANCELED)

47. (NOT AMENDED) The process of claim 45, further comprising splitting the adhered membrane, nozzle part, and heat driving part into separate fluid jetting apparatuses.